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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/767,798	01/29/2004	Neil G. Murray JR.	TRW(TE)6888	7228

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EXAMINER	
VERBITSKY, GAIL KAPLAN	

ART UNIT	PAPER NUMBER
2859	

DATE MAILED: 10/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/767,798	MURRAY ET AL.	
	Examiner	Art Unit	
	Gail Verbitsky	2859	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 July 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8,12-21 and 24-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,12-21,24-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-5, 12-16, 18, 20, 26, 29-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al. (U.S. 20040056006) [hereinafter Jones] in view of Sandvoss (U.S.7044634), Hashimoto et al. (U.S. 4083223) [hereinafter Hashimoto].

Jones discloses in Fig. 1 a device/ method in the field of applicant's endeavor comprising welding of two abutted (clamped together) plastic pieces 1, 2 to form a weld. The piece (second plastic piece) 1 may be transmissive/ transparent to an IR radiation ([0035]) from the radiation beam 4 (paragraph [0033]) from a radiation source/ laser 5. The piece (first plastic piece) 2 can comprises a radiation absorbing material ([0018], [0034]).

Jones does not explicitly teach to collect thermal radiation passing through the second piece. Jones does not teach obtaining a thermal image/ thermal data) of the weld. Jones does not teach obtaining a feedback signal, and modifying heating in response to the feedback signal. Jones does not teach to collect thermal radiation passing through the second piece. Jones does not teach to simultaneously with the

heating (welding) collect thermal radiation, in combination with the remaining limitations of claims 1-5, 13-16, 18, 20, 26, and 29-32.

Sandvoss discloses a device/ method in the field of applicant's endeavor comprising heating a weld with a laser beam (at some speed that can be changed) taking temperature/ thermal image simultaneously (paragraph [0020]) by using a thermal camera/ CCD so as to obtain a quality of a weld (paragraph [0057]). The camera can cover the surface completely (entire surface) or partially (paragraph [0038]). The device also comprises a feedback to control the laser beam paragraph [0054]). The device compared the data with a threshold (paragraph [0046]).

For claims 4-5: it is inherent that, by using an infrared camera and obtaining a thermal image, the device is capable to determine temperature of each portion of the weld reflecting in pixels (paragraph [0021]).

For claims 29-30: Sandvoss also teaches an alarm. Sandvoss also teaches to reflect the laser beam with a reflective device (mirror, paragraph [0039]) used to control and align the laser beam, wherein, the mirrors are not in the field of view of the camera as shown in Fig. 1, but the light heating the weld is.

For claim 31: it is, inherent, that more than one image can be collected.

For claim 32: It is, inherent, that the feedback signal is a result of analyzing a previous image, and more than feedback signals can be provided to the weld controller.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the IR thermal data means, disclosed by Jones, so as to have a thermal image means, in order to enable the operator to obtain a visual

data of the weld by collecting the thermal radiation through the second piece, as taught by Sandvoss, so as to provide the operator with a visual thermal data which could allow to immediately see defects and lack of integrity of the weld, in order to take necessary actions. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device, disclosed by Jones, so as to simultaneously heating and obtaining an image, as taught by Sandvoss, so as to allow the operator to in real time analyze the image and take immediate actions simultaneously with heating the weld and thus, to avoid enhancing the defect in the weld by a possible overheating.

Hashimoto discloses in Fig. 1 a method/ device for monitoring quality of a weld comprising heating the weld and immediately (substantially simultaneously) acquiring a thermal distribution signal on another side of a second piece (col. 2, lines 25-33). The device also has a feedback control for analyzing the data and determining if the data meets an associated criterion, and modifying the heating/ cooling and providing a warning signal/ alarm.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add a control device with a feedback to the device, disclosed by Jones, so as to allow the operator to control defects, lack of integrity of the weld caused by improper welding process/ improper heating by controlling the weld temperature within predetermined (desired/ standard) limits.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device disclosed by Jones, so as to have an

alarm, as taught by Hashimoto, in order to enable the device to interrupt welding should a failure occurs.

The method steps will be met during the normal operation of the device stated above.

3. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jones, Sandvoss and Hashimoto, as applied to claims 1-5, 12-16, 18, 20, 26, 29-32 above, and further in view of Schepard (U.S. 6585146).

Jones, Sandvoss and Hashimoto disclose a device/ method as stated above.

They do not explicitly teach to obtain a size/ width of the weld.

Schepard discloses a device in the field of applicant's endeavor, the device can be used to determine the size (thus, inherently, width) of the weld and the quality (presence of cracks, voids, defects, discontinuities) of the bond (col. 7, lines 1-2) and, inherently, compare them to the threshold (standard) by means of the histogram.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add a feature capable of determining the size of the weld, as taught by Schepard, so as to control the size of the weld, and thus the quality of the weld, because the proper weld size is very important in some miniature applications.

4. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jones, Sandvoss, Hashimoto and Schepard, as applied to claim 7 above, and further in view of Traub et al. (U.S. 4214164) [hereinafter Traub].

Jones, Sandvoss, Hashimoto and Schepard disclose a device/ method as stated above.

They do not explicitly teach the particular weld controller as claimed by applicant.

Traub teaches a device / method in the field of applicant's endeavor wherein, in an automatic mode, a thermal signal from a weld is compared to a signal recorded in memory (reference/ threshold), if the signal is higher or lower than the reference (does not meet an associated criterion), welding parameters are being adjusted by a (feedback) control circuitry (weld controller).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the controller of the device, disclosed by Jones, Sandvoss, Hashimoto and Schepard, so as to have a feedback weld controller, as taught by Traub, in order to enable the device not only to detect failure but also to implement corrective functions.

The method steps will be met during the normal operation of the device stated above.

5. Claims 6, 17, 19, 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones, Sandvoss and Hashimoto, as applied to claims 1-5, 12-16, 18, 20, 26, 29-32. above, and further in view of Traub et al. (U.S. 4214164) [hereinafter Traub].

Jones, Sandvoss and Hashimoto disclose a device/ method as stated above.

They do not explicitly teach the particular weld controller as claimed by applicant.

Traub teaches a device / method in the field of applicant's endeavor wherein, in an automatic mode, a thermal signal from a weld is compared to a signal recorded in memory (reference/ threshold), if the signal is higher or lower than the reference (does

not meet an associated criterion), welding parameters are being adjusted by a (feedback) control circuitry (weld controller).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the controller of the device, disclosed by Jones, Sandvoss and Hashimoto, so as to have a feedback weld controller, as taught by Traub, in order to enable the device not only to detect failure but also to implement corrective functions.

The method steps will be met during the normal operation of the device stated above.

6. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jones, Sandvoss and Hashimoto as applied to claims 1-5, 13-16, 18, 20, 26, 29-32 above, and further in view of Ish-Shalom et al. (U.S. 6299346) [Ish-Shalom].

Jones, Sandvoss and Hashimoto disclose the device and method as stated above.

They do not teach the limitations of claim 24.

Ish-Shalom discloses a device wherein in order to obtaining a correct temperature (thermal data) of a test sample (wafer), an IR wavelengths from the heating lamps cut off (filtered).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device, disclosed by Jones, Sandvoss and Hashimoto, so as to cut off the heating radiation from the final thermal data results, as taught by Ish-Shalom, in order to preserve the accuracy of the thermal data, as already suggested by Ish-Shalom.

The method steps will be met during the normal operation of the device stated above.

7. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jones, Jones, Sandvoss and Hashimoto as applied to claims 1-5, 13-16, 18, 20, 26, 29-32 above, and further in view of Emmelmann (U.S. 6201211).

Jones, Sandvoss and Hashimoto disclose the device and method as stated above.

They do not explicitly teach the limitations of claim 25.

Emmelmann discloses in Fig.1 a device in the field of applicant's endeavor comprising an up/ down movable laser welding head/ beam for properly focusing the laser beam. This would imply, that the level of laser energy changes with the laser beam movement.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device, disclosed by Jones, Sandvoss and Hashimoto, so as to have a movable laser welding beam, as taught by Emmelmann, in order to properly focus the laser beam over the weld, as already suggested by Emmelmann, in order to adjust the distance and thus, the laser energy / heat delivered to the weld.

Response to Arguments

8. Applicant's arguments with respect to claims 1-8, 12-21 and 24-32 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The prior art cited in the PTO-892 and not mentioned above disclose related devices and methods.

Takeda et al. (U.S. 6462299) discloses the device and method in the field of applicant's endeavor comprising pieces 1a and 1b abutting each other for forming a weld (pool) and heating them with an induction heating apparatus 9 while the temperature is raised to a predetermined (annealing) temperature. This would imply, that the heating and temperature measurements (thermal image) are done simultaneously.

Geler et al. (U.S. 5474225) discloses the device and method in the field of applicant's endeavor. Geler monitors a just completed weld.

Jones (U.S. 4224499) discloses the device and method in the field of applicant's endeavor comprising a copper and an aluminum pieces butt-welded. The process involving heating and melting (pool formation) their interface. Jones does not teach to take IR images simultaneously with heating.

Juret et al. (U.S. 6177649) teaches to monitor a welding process by obtaining thermal images by using an IR camera in real time (simultaneously). Juret teaches to monitor the quality of weld and control the welding process. If a defect of the weld is noted (weld does not meet a required criteria), the weld head should be repaired (changing variables).

Shepard (U.S. 6585146), discloses in Fig. 1 a device/ method for monitoring quality of weld 106 being formed between first and second pieces (surfaces) 104a and 104b of a material 104. The method comprising the steps of heating the material 104 and the weld 106 with a heating source 102, collecting an infrared radiation (infrared wavelengths) passing through the material on the second surface (second piece) 104b, obtaining an image (plurality of images/ thermal data) by a camera 108, and analyzing the image by a computer 112. This would imply, that the camera captures the weld/ weld pool image in its entirely (thermal image/ temperature of each portion of the weld pool).

Chande et al. (U.S. 4817020) [hereinafter Chande] discloses in Fig. 3 a device/ method in the field of applicant's endeavor wherein a characteristic/ process parameter corresponding to a quality of the weld is a cooling rate (col. 1, lines 12-30). Chande teaches to obtain a real-time thermal image/ simultaneously with directing/ heating by a

laser beam (col. 6, lines 45-68, col. 14, line 68), analyzing the image and providing a feedback to a weld controller, such that modifying a cooling rate (thus heating) in response to a feedback signal. This would imply that the thermal image (temperature) is being somehow compared with an image standard/ predetermined or desired image or threshold. Chande states that other thermal imagers can be used (col. 14, line 68, col. 15, lines 1-3).

Dostoomian discloses the device and method in the field of applicant's endeavor comprising welding together two materials in a localized spot by providing a heating energy (by spot welders), and monitoring the spot (pool) for quality by obtaining an IR energy (thermal data) from the pool. This would imply that the device has a means for obtaining the thermal data. The device comprises a controller which adjusting the heating energy (magnitude of the weld current) by obtaining an IR energy/ temperature from the welding tips, while the IR energy provides a measure of the temperature (thermal data) of the weld (col. 3, lines 5-6). The controller has a differential circuit for generating an error signal and apply (feedback) it to the input of the spot welder (heater) throughout the course of the welding operation (heating) in response to the thermal data /temperature evaluation of the weld as compared to the standard thermal history stored in a memory and controlling (modifying) the welding current (heating) as required (in response to the feedback signal).

Any inquiry concerning this communication should be directed to the Examiner Verbitsky who can be reached at (571) 272-2253 Monday through Friday 8:00 to 4:00 ET.

GKV

Gail Verbitsky G. Verbitsky
Primary Patent Examiner, TC 2800

September 22, 2006